BHARATHIAR UNIVERSITY, COIMBATORE
M. Sc. COMPUTER TECHNOLOGY DEGREE COURSE WITH COMPULSORY DIPLOMA IN SOFTWARE QUALITY ASSURANCE *(Affiliated Colleges)*
(Effective from the academic Year 2008-2009)
SCHEME OF EXAMINATIONS – CBCS PATTERN

Sem	Study Components	Course title	Ins. hrs/week	Dur.Hrs	CIA	Marks	Total Marks	Credit
	Semester I							
I	Paper I Advanced Computer Architecture		5	3	25	75	100	4
	Paper II Advanced Java Programming		5	3	25	75	100	4
	Paper III Principles of Compiler Design		5	3	25	75	100	4
	Paper IV Object Oriented Analysis and Design		5	3	25	75	100	4
	Paper V Analysis & Design of Algorithms		3	3	25	75	100	5
	Practical I Advanced Java Lab		4	3	40	60	100	5
	Elective / Dip. Paper I Software Quality Assurance		3	3	25	75	100	3
II	Paper VI Network Security and Cryptography		5	3	25	75	100	4
	Paper VII Unix Programming		5	3	25	75	100	4
	Paper VIII Distributed Operating System		5	3	25	75	100	4
	Special Elective I		5	3	25	75	100	4
	Practical II Unix Programming Lab		3	3	40	60	100	5
	Elective / Dip. Paper II Software Reliability		3	3	25	75	100	3
III	Paper IX Mobile Computing		5	3	25	75	100	4
	Paper X Programming in C# and .Net framework		5	3	25	75	100	4
	Paper XII Web Services		5	3	25	75	100	4
	Special Elective II		5	3	25	75	100	4
	Practical III C# .Net Programming Lab		5	3	40	60	100	5
	Elective / Dip. Paper III Software Testing		5	3	25	75	100	3
	Elective / Dip. Paper IV Software Testing Lab		5	3	40	60	100	3
IV	Project work and Viva voce		-	-	-	-	200*	9
		Total					2200	90

* Project report - 160 marks; Viva-voce – 40 marks

SPECIAL ELECTIVES I	SPECIAL ELECTIVES II
I.1 Embedded Systems	II.1 Client / Server Technology
I.2 Multimedia Systems	II.2 Data Mining & Warehousing
I.3 Neural Networks and Fuzzy Logic	II.3 Distributed Computing
I.4 Simulation & Modeling	II.4 Wireless Application Protocol

PAPER I   : ADVANCED COMPUTER ARCHITECTURE

Subject Description
       This Course presents the Advanced Computer Architecture emphasizing parallel processing, solving problems in parallel and SIMD processors.
Goals : To enable the students to learn the parallel processing and SIMD arrays.
Objectives
 On successful completion of the course the students should have:
- Understood the trends and principles of parallel processing in computers.
- Gained problem solving skills using parallel algorithms.

Contents

UNIT I
       Introduction to parallel processing – Trends towards parallel processing – Parallelism in uniprocessor Systems – Parallel Computer structures – Architectural Classification schemes – Flynn' Classification – Feng's Classification – Handler's Classification – Parallel Processing Applications

UNIT II
       Solving Problems in Parallel: Utilizing Temporal Parallelism – Utilizing Data Parallelism – Comparison of Temporal and Data Parallel Processing – Data parallel processing with specialized Processor – Inter-task Dependency. Instructional Level Parallel Processing – Pipelining of Processing Elements – Delays in Pipeline Execution – Difficulties in Pipelining

UNIT III
       Principles Linear Pipelining – Classification of Pipeline Processors – General Pipeline and Reservation tables – Arithmetic Pipeline – Design Examples – Data Buffering and Busing structure – Internal forwarding and Register Tagging – Hazard Detection and Resolution – Job sequencing and Collision prevention – Vector processing requirements – Characteristics – Pipelined Vector Processing methods

UNIT IV
        SIMD Array Processors – Organization – Masking and Data routing – Inter PE communications – SIMD Interconnection Networks – Static Vs Dynamic – Mesh connected Illiac – Cube interconnection network – Shuffle-Exchange and Omega networks - Multiprocessor Architecture and programming Functional structures – interconnection Networks.

UNIT V
       Parallel Algorithms: Models of computation – Analysis of Parallel Algorithms Prefix Computation – Sorting – Searching – Matrix Operations.

REFERENCE BOOKS
1. Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" Mc Graw – Hill Book Company, 1985.

2. V. Rajaraman, C. Siva Ram Murthy, "Parallel Computers Architectures and Programming", PHI, 2003.
3. Kai Hwang, "Advanced Computer Architecture –Parallelism, Scalability, Programmability", TataMcgraw Hill, 2001.
4. Michael J. Quinn, "Parallel Computing Theory and Practice", TMCH, Second Edition, 2002.
5. Barry Wilkinson, Micheal Allen, "Parallel Programming: Techniques and Applications", Prentice Hall, 1999.

PAPER II: ADVANCED JAVA PROGRAMMING

Subject Description:
This course presents the concepts of RMI, JDBC and JSP.

Goal:
To enable the students to learn the basic functions, principles and concepts of advanced java programming.

Objectives:
On successful completion of the course the students should have:
- Acquired skill in advanced java programming.

Unit I
Java Basics Review: Components and event handling – Threading concepts – Networking features – Media techniques

Unit II
Remote Method Invocation-Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation-Object Serialisation-Java Spaces

Unit III
Java in Databases- JDBC principles – database access- Interacting- database search – Creating multimedia databases – Database support in web applications

Unit IV
JAVA SERVER PAGES-JSP Overview-Installation-JSP tags-Components of a JSP page-Expressions-Scriptlets-Directives-Declarations-A complete example

Unit V
JAR file format creation – Internationalization – Swing Programming – Advanced java techniques

Reference:
1.Jamie Jaworski, "Java Unleashed" , SAMS Techmedia Publications 1999
2.Campione, Walrath and Huml, "The Java Tutorial", Addison Wesley 1999
3. Jim Keogh," The Complete Reference J2EE", Tata McGrawHill Publishing Company Ltd,2002

PAPER III PRINCIPLES OF COMPILER DESIGN

SUBJECT DESCRIPTION : This course presents the structure of compiler & it explain the functions of each phase of a compiler.

GOALS : To enable the student to learn the structure of compiler.

OBJECTIVES : On successful completion of the course the students should have
        Understood the different phases of compiler.
        One can design C compiler on his own.

UNIT I
Introduction : Structure of a compiler - Compiler writing tools - Basic constructs of high level programming languages : Data structures, parameter transmission. Lexical Analysis - Role of a lexical analyzer - Finite automata - Regular expressions to finite automata Minimizing the number of states of a deterministic finite automaton - Implementation of a lexical analyzer.

UNIT II
Parsing techniques - Context free grammars - Derivations and parse - Capabilities of context free grammars. Top down bottom up parsing - Handles - Shift reduce parsing - Operator - Parsing - recursive descent parsing - Predictive parsing.

UNIT III
Automatic parsing techniques - LR parsers - Canonical collection of LR (0) items - Construction of SLR parsing tables - LR(l) sets of items construction - Construction of canonical LR parsing tables.

UNIT IV
Syntax Directed Translation - Semantic actions - Implementation of syntax directed translators - Intermediate code : Postfix notation: quadruples: Indirect triples - methods of translation of assignment statements, Boolean expressions and control statements.

UNIT V
Symbol tables and c ode generations - Representing information in symbol table - Data structures for symbol tables - Introduction to code optimization: Basic blocks: Dag representation - Error deduction and recovery - Introduction to code general ion.

REFERENCE BOOKS:
I. Aho. A.V and Uliman J.D, "Principles of compiler design", Addison Wesley publishing company, 1978.

2. Dhamdhere D.M, "Compiler construction principles and practice", Mac Millan India Ltd, 1983.
3. Holub Allen I, "Compiler design in C", Prentice Hall of India, 1990.

PAPER IV : OBJECT ORIENTED ANALYSIS AND DESIGN

Subject Description:
This course presents the object model, classes and objects, object orientation, machine view and model management view.
Goal:
To enable the students to learn the basic functions, principles and concepts of object oriented analysis and design.
Objectives:
On successful completion of the course the students should have:
- Understood the object oriented system development and case models.

UNIT I
Object Orientation – System Development – Review of Objects – Inheritance – Object Relationships – Dynamic binding – OOSD life cycle – Process – Analysis- Design - Prototyping – Implementation – Testing – Overview of Methodologies

UNIT II
OMT – Booch methodology, Jacobson – Methodology – patterns – Unified approach – UML – Class Diagrams – Dynamic Modeling

UNIT III
Using Case model – Creation of classes – Noun Phrase approach – responsibilities – Collaborators and relationships – Super – Sub class - Aggregation

UNIT IV
OO Design axioms – Class visibility – refining attributes- Methods – Access layer – OODBMS – Class mapping view layer

UNIT V
Quality Assurance testing – Inheritance and testing - Test Plan – Usability testing – User satisfaction testing

References:
1. Ali Brahmi , " Object Oriented System Development" , TMH Intl Edition
2. Object-Oriented Analysis and Design by Grady Booch, Addison – Wesley
3. Object Oriented Modelling and Design by James Rumbaugh , Micheal Blaha, Prentice Hall

PAPER V   ANALYSIS & DESIGN ALGORITHMS

Subject Description
This course presents an introduction to the algorithms, their analysis and design and various methods like divide and conquer method, Dynamic programming, backtracking and parallel models.
Goals
To enable the students to learn the Elementary Data Structures and algorithms.
Objectives
On successful completion of the course the students should have
  • Understood the various design and analysis of the algorithms.

Contents
UNIT I
        Introduction:- algorithm definition and specification – performance analysis – Elementary Data structures:- stacks and queues – trees – dictionaries – priority queues – sets and disjoint set union – graphs – basic traversal and search techniques.

UNIT II
        Divide – and – conquer: - General method – binary search – merge sort – quick sort – The Greedy method:- General method – knapsack problem – minimum cost spanning tree – single source shortest path.

UNIT III
        Dynamic Programming - general method – multistage graphs – all pair shortest path – optimal binary search trees – 0/1 Knapsack – traveling salesman problem – flow shop scheduling.

UNIT IV
        Backtracking:- general method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles – knapsack problem – Branch and bound:- The method – 0/1 Knapsack problem – traveling salesperson.

UNIT V
        Parallel models:- Basic concepts, performance Measures. Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel Multiplication and division, Parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence.

 REFERENCE BOOKS

   1. Ellis Horowitz, "Computer Algorithms", Galgotia Publications.
   2. S. Lakshmivarahan, Sundarshan K.Dhall, "Analysis and Design of Parallel Algorithms".
   3. Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman, "Data Structures and Algorithms".
   4.   Goodrich, "Data Structures & Algorithms in Java", Wiley 3rd edition

PAPER VI   NETWORK SECURITY AND CRYPTOGRAPHY

Subject Description
This course presents the Introduction to Cryptography, Web Security and Case studies in Cryptography

Goals
To enable the students to learn the concepts of Network Security and Cryptography

Objectives
On Successful completion of the course the students should have:
- Understood the process of implementing the cryptographic algorithms.

Contents

UNIT I

Introduction to Cryptography – Security Attacks – Security Services –Security Algorithm - Stream cipher and Block cipher - Symmetric and Asymmetric-key Cryptosystem Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.

UNIT II

Public-key Cryptosystem: Introduction to Number Theory - RSA Algorithm – Key Management - Diffie-Hell man Key exchange – Elliptic Curve Cryptography Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

UNIT III

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication services and Encryption Techniques. E-mail Security – PGP – S / MIME – IP Security.

UNIT IV

Web Security - Secure Socket Layer – Secure Electronic Transaction. System Security - Intruders and Viruses – Firewalls– Password Security

UNIT V

Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming).
Network Forensic – Security Audit - Other Security Mechanism: Introduction to: Stenography – Quantum Cryptography – Water Marking - DNA Cryptography

REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security", PHI/Pearson Education.
2. Bruce Schneir, "Applied Cryptography", CRC Press.
3. A.Menezes, P Van Oorschot and S.Vanstone, "Hand Book of Applied Cryptography", CRC Press, 1997 [Free Downloadable].
4. Ankit Fadia,"Network Security", MacMillan.

PAPER VII: UNIX PROGRAMMING

Subject Description:
This course presents the introduction, inter process communication, classical IPC problems, shell programming and system programming in UNIX.
Goal:
To enable the students to learn the basic fundamentals of UNIX operating system, and UNIX programming
Objectives:
On successful completion of the course the students should have:
- Understood the UNIX file system.
- Learnt shell programming & system programming in UNIX

UNIT I

Unix – Introduction – Basic commands – files – permissions – directories – processes – pipes – redirection – filters – vi editor – unix file system – unix file structure.

UNIT II

Shell programming – Shell Syntax : Variables – conditions – control structures – functions – commands – command execution – simple programs

UNIT III

Unix System Programming – System calls and device drivers – Library functions – low level file access – system calls for managing files – files and directory maintenance – scanning directories.

UNIT IV

Process and signals – process – process structure – starting new processes – signals

UNIT V

Interprocess communication – Pipes: process pipes – pipe call – parent and child processes - Semaphores: Definition – example – facilities – shared memory: overview – functions – message queue: overview – functions – Sockets: socket connections.

REFERENCE BOOKS:

1. Peter Dyson, Stan Kelly – Bootle, John Heilborn, "UNIX Complete", BPB Publications, 1999
2. Richard Stones, Neil Matthew, "Beginning Linux Programming", WROX, 1999
3. Uresh Vahalia, "UNIX Internals, The New Frontiers", Pearson Education Limited, 2002

PAPER VIII - DISTRIBUTED OPERATING SYSTEM

Subject Description
        This Course presents the fundamentals of Operating System

Goals
 To enable the students to learn the functions of Operating System.

Objectives
 On successful completion of the course the students should have:
   - Understood the fundamentals of distributing system and how the memory can be shared.

Contents

UNIT I
        FUNDAMENTALS: What is Distributed Computing System? – Evolution – System Models – Issues.
        MESSAGE PASSING: Introduction – Features – Isses in IPC by Message Passing – Synchronization – Buffering Multi-datagram Messages – Encoding and Decoding of Message Data – Process Addressing – Failure Handling – Group Communication.

UNIT II
        RPC: Introduction – Model – Transparency of RPC – Implementing RPC Mechanism – Stub Generation – RPC Messages – Server Management – Parameter-Passing and Call Semantics – Communication Protocols for RPC's – Client-Server Binding – Exception Handling – Security – Types of RPC's – Lightweight RPC

        DISTRIBUTED SHARED MEMORY: Introduction – Architecture of DSM Systems – Design and Implementation Issues of DSM - Granularity – Structure of Shared Memory Space – Consistency Models – Thrashing.

UNIT III
        SYNCHRONIZATION: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms.

        RESOURCE MANAGEMENT: Introduction – Features – Task Assignment Approach – Load-Balancing Approach – Load-Sharing Approach

UNIT IV

     PROCESS MANAGEMENT: Introduction – Process Migration – Threads. **DISTRIBUTED FILE SYSTEMS**: Introduction – Features – File Models – File-Accessing Models – File-Sharing Semantics – File-Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles.

UNIT V

     NAMING: Introduction – Features – Fundamental Terminologies and Concepts – System-Oriented Names – Object-Locating Mechanisms – Human-Oriented Names – Name Caches – Naming and Security.

     CASE STUDIES: Introduction – Amoeba – V-System – Mach – Chorus.

REFERENCE BOOKS:
1. Pradeep. K . Sinha. "Distributed Operating System" ,Second Edition PHI , 2001
2. Tanenbaum – Distributed Operating System", Pearson Education.

3. Dhamdhere – Operating Systems : A concepts – based approach, TMH.
4. Singhal – Advanced Concepts in Operating Systems, 2001, TMH.
5. Tanenbaum – Distributed Systems : Principles & Paradigms, Pearson Education.

Paper IX : MOBILE COMPUTING

Subject Description:
This course presents an introduction to mobile computing, discusses mobile computing architecture, emerging technologies and security issues.
Goals:
To enable the student learn the basics of mobile computing.
Objectives:
On successful completion of the course the student should have:
* Understood the concept of wireless mobile computing.

Contents:

UNIT I: Introduction – Vertical and applications of Wireless Networking – Positioning of Wireless networking relative to wired networks – Wireless LAN and Wireless WAN – Wireless PBXs map – The Radio Spectrum cell size and achievable throughput. Wireless transmission – Frequencies for radio transmission – Regulations – Signals, Antennas, Signal propagation, path loss of radio signals, Additional signal propagation effects- Multi-path propagation – Multiplexing.

Chapters: (1, 2.1 – 2.5)

UNIT II: Space division multiplexing – Frequency division multiplexing – time division multiplexing – Code division multiplexing. Spread spectrum – Direct sequence spread spectrum

– Frequency hopping spread spectrum – Cellular systems. Medium access control – Hidden and exposed terminals – Near and far terminals – SDMA, FDMA, TDMA, Fixed TDM, Classical Aloha, slotted Aloha, Carrier sense multiple access – Reservation TDMA – Multiple access with collision avoidance – Polling – CDMA – Spread Aloha multiple access.
Chapters: (2.5.1, 3, 3.5.1)

UNIT III: Comparison of S/T/F/CDMA.GSM – Mobile services – System architecture – Radio interface – Protocols – Localization and calling – Handover – Security – Location Management for Mobile Cellular Systems – GPRS – Mobile services – System Architecture.
Chapters: (3.6, 4, 4.2).

UNIT IV: UMTS and IMT – 2000.Wireless LAN – Infra red vs. radio transmission – Infrastructure and ad-hoc network – IEEE 802.11 – System architecture – Protocol architecture – Physics layer – Medium access control layer – MAC management – Blue tooth. Mobile network layer – Mobile IP – Goals, assumptions and requirements – entities and terminology – packet delivery – Agent discovery – Registration – Tunneling and encapsulation Recent technologies
Chapters: (4.4, 7.1, 7.2, 7.3, 7.5, 8, 8.1).

UNIT V: World Wide Web - WAP – Architecture – wireless datagram Protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language, WML script – Mobile computing applications using J2ME.
Chapters: (10.2, 10.3).

REFERENCE BOOKS:

1. John Schiller, "MOBILE COMMUNICATIONS", Addison Wesley, 2003.
2. Rifaat A. Dayen "MOBILE DATA & WIRELESS LAN TECHNOLOGIES", Prentice Hall,   1997.
3. Steve Mann and Scoot Schibli, "THE WIRELESS APPLICATION PROTOCOL", John Wiley &Sons, inc., 200.
4. Steve Mann, "PROGRAMMING APPLICATIONS WITH THE WIRELESS APPLICATION PROTOCOL", John Wiley & Sons, Inc., 2000

PAPER X   PROGRAMMING IN C# AND .NET FRAMEWORK

Subject Description
 This Course presents the programming in C# and .Net framework

emphasizing problem solving using C#.

Goals
 To enable the students to learn the concepts of . Net framework and C# language.

Objectives
 On successful completion of the course the students should have:
* Understood the trends and principles of .Net framework
* Gained problem solving skills using C#.

Contents
UNIT I

Introduction to .NET frame work - . NET objects – ASP .NET - .NET Web services – Windows forms

UNIT II

Introduction to C# - Understanding c# in .NET - Overview of C# - Literals, variables and data types

UNIT III

Operators, Expressions, Branching and looping operations – Methods, Arrays, Strings

UNIT IV

Structures and Enumerations – Classes and Objects – Inheritance and Polymorphism, Multiple Inheritance

UNIT V

Operator overloading, Events, console I/O operations and Exceptions

References:
1. E. Balagurusamy, "Programming in C#", *Tata McGraw-Hill, 2002*
2. David S. Platt, "Introducing Microsoft .NET", *Microsoft Press, SAARC Edition, 2001*
3. Microsoft, "C# Language Specifications", *Microsoft Press, 2001*

PAPER XII   WEB SERVICES

Subject Description :   This Course presents the elements of web services with an emphasis building client server applications with XML

Goals : To enable the students to learn the concepts of web services
Objectives
 On successful completion of the course the students should have:
* Understood the trends and principles of web services

Contents
UNIT I

Introduction to Web services – Industry standard, Technologies and concepts underlying web services – their support to Web Services, Application that consume Web Services.

UNIT II

XML – its choice for Web Services – Network protocol to backend data base – Technologies – SOAP, WSDL,   exchange of information between application in distributed environment – Locating remote Web Services – its access and usage, UDDI Specifications – an introduction.

UNIT III

A brief outline of Web Services – conversation static and interactive aspects of systems interface and its implementation. work flow- Orchestration and Refinement, Transactions, Security issues – Common attacks – Security Attacks facilitated within Web Services – Quality of service - Architecting of system to meet users request with respect to latency, performance reliability, QOS metric, mobile and wireless services – energy consumption – Network bandwidth utilisation, portal and service management.

UNIT IV

Building real world enterprise application using Web Services – sample source codes to develop Web Services – steps necessary to build and deploy Web Services and Client application to meet customer's requirement – Easier development, customisations, maintenance, Transaction requirement, seamless porting to multiple devices and platform.

UNIT V

Development of Web services and application onto to meet application server and AXB SOAP server (both are freewares) – Web Services platform as a set of enabling technologies for XML base d distributed computing.

Reference:
1. Sandeep Chatterjee, James Webber: "Developing Enterprise Web Services: An Architect Guide", *Prentice Hall 2003.*
2. Keith Ballinger "Net Web Server: Architecture and Implementation with .NET": *Pearson Education 2003.*
Anne Thomas Manes, "Web Server : A Manager Guide": *Addison Wesley*

COMPULSORY DIPLOMA IN SOFTWARE QUALITY ASSURANCE (DSQA)
DIPLOMA PAPER I : SOFTWARE QUALITY ASSURANCE

Subject Description
This Course presents the essentials of Software Qulaity, Plan for SQA, Standards, Tools for SQA.

Goals:
To enable the students to learn the Concepts and Principles of SQA.

Objectives :
On successful completion of the course the students should have:
- Understood the principles of SQA
- Must be able to judge the quality of Softwares.

Content

UNIT I

Introduction to software quality – Software modeling – Scope of the software quality program – Establishing quality goals – Purpose, quality of goals – SQA planning software – Productivity and documentation.

UNIT II

Software quality assurance plan – Purpose and Scope, Software quality assurance management - Organization – Quality tasks – Responsibilities – Documentation.

UNIT III

Standards, Practices, Conventions and Metrics, Reviews and Audits – Management, Technical review – Software inspection process – Walk through process – Audit process – Test processes – ISO, cmm compatibility – Problem reporting and corrective   action.

UNIT IV

Tools, Techniques and methodologies, Code control, Media control, Supplier control, Records collection, Maintenance and retention, Training and risk management.

UNIT V

ISO 9000 model, cmm model, Comparisons, ISO 9000 weaknesses, cmm weaknesses, SPICE – Software process improvement and capability determination.

REFERENCES
1. Mordechai Ben – Meachem and Garry S.Marliss, "Software Quality – Producing Practical, Consistent Software", International Thompson Computer Press, 1997
2. Watt. S. Humphrey, "Managing Software Process", Addison – Wesley, 1998.
3. Philip.B.Crosby, "Quality is Free : The Art of making quality certain", Mass Market, 1992.

DIPLOMA PAPER II : SOFTWARE RELIABILITY

Subject Description
This course provides the insight in to the reliability factors of the Software.

Goal :
To enable the students to learn about the principle and concepts of Software reliability.

Objectives :
On successful completion of the course the students must have
- understood the concepts of Software reliability
- analysed the quality standards

Content
UNIT I
Software Reliability Definitions - software disasters - Errors - faults - failures - different views of software reliability – software requirements specification - Causes of unreliability in software - Dependable systems: reliable, safe, secure, maintainable, and available - Software maintenance.

UNIT II
   The phases of a Software Project - Monitoring the development process – The software life cycle models - software engineering - Structured Analysis and structured Design - Fault tolerance - Inspection - Software cost and schedule.

UNIT III
Software quality modeling - Diverse approaches and sources of information - Fault avoidance, removal and tolerance - Process maturity levels (CMM) - Software quality assurance (SQA) - Monitoring the quality of software - Total quality management (TQA) - Measuring Software Reliability - The statistical approach - Software reliability metrics.

UNIT IV
Data Trends - Complete prediction Systems - overview of some software reliability models - The recalibration of the models - Analysis of model accuracy - Reliability growth models and trend analysis - Software Costs Models - Super models.

UNIT V
Testing and maintaining more reliable software –logical testing – functional testing – algorithm testing – regression testing - fault tree analysis – failure mode effects and critical analysis – reusability - case studies.

REFERENCES
   1. J.D. Musa, A. Iannino and K.Okumoto, Software Reliability, Measurement, Prediction, Application, McGraw Hill, 1990.
   2. J.D. Musa, Software Reliability Engineering, McGraw Hill, 1998.
   3. Michael R. Lyer, Handbook of Software Reliability Engineering, McGraw Hill, 1995.
   4. Xie, M., Software Reliability Modelling, World Scientific, London, 1991.

DIPLOMA PAPER III: SOFTWARE TESTING

Subject Description
This course provides principles of Software Testing and about tools.
Goal :
To enable the students to learn about the principle and tools of Software testing.
Objectives :
On successful completion of the course the students must have
   • understood the concepts of Software testing
   • got the skill of software testing
   • exposed to software testing tools.

Content

UNIT I

Purpose of Software testing – Some Dichotomies – a model for testing – Playing pool and consulting oracles – Is complete testing possible – The Consequence of bugs – Taxonomy of Bugs.

UNIT II

Software testing Fundamentals – Test case Design – Introduction of Black Box Testing and White Box testing – Flow Graphs and Path testing – Path testing Basics - Predicates, Path Predicates and Achievable Paths - Path Sensitizing – Path Instrumentation – Implementation and Application of Path Testing.

UNIT III

Transaction Flow testing – Transaction Flows – techniques – Implementation Comments – Data Flow Testing – Basics – Strategies – Applications, Tools and effectiveness – Syntax Testing – Why, What, How – Grammar for formats – Implementation – Tips.

UNIT IV

Logic Based Testing – Motivational Overview – Decision tables – Path Expressions – KV Charts – Specifications – States, State Graphs and transition Testing – State Graphs – Good & bad states – state testing Metrics and Complexity.

UNIT V

Testing GUIs – Testing Client – Server Architecture – Testing for Real-time System – A Strategic Approach to Software testing – issues – unit testing – Integration Testing – Validation testing – System testing – The art of Debugging.

REFERENCES :

1. Boris Beizer, Software testing techniques, Dreamtech Press, Second Edition – 2003.
2. Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons,1979
3. Roger.S.Pressman, Software Engineering – A Practitioner's Approach ,Mc-Graw Hill, 5th edition, 2001
4. Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India,2007

DIPLOMA PAPER IV: SOFTWARE TESTING LAB

Subject Description
This course provides hand on experience of Software Testing tools.

Goal :
To enable the students to learn about the usage of tools of Software testing.

Objectives :
On successful completion of the course the students must have
- understood the concepts of Software testing
- got the skill of software testing tools
- expertise in using software testing tools.

Running and testing in any one of the following Testing tools :

- WinRunner
- Silk Test
- SQA Robot
- LoadRunner
- JMeter
- TestDirector
- GNU Tools (Source Code Testing Utilities in Unix / Linux)
- Quick Test Professional

REFERENCE :

Dr.K.V.K.K.Prasad, Software Testing Tools, Dreamtech Press, 2007

SPECIAL ELECTIVE I.1   EMBEDDED SYSTEMS

Subject Description:
This course presents the introduction to embedded systems, Devices and Buses for Device Networks, Program modelling concepts, Inter – process communication & Synchronization of processes, Tasks and threads.

Goal:
To enable the students learns the embedded systems concepts and fundamentals.
Objectives:
On Successful completion of the course the students should have:
- Understood the RTOS concepts.
- Understood the Embedded software Development

UNIT I

Introduction to Embedded Systems: An embedded System – Processor in the system – Other hardware units – software embedded into a system – Exemplary Embedded systems – On chip and in VLSI Circuit. Processor and Memory selection for an Embedded systems.

UNIT II

Devices and Buses for Device Networks: I/O devices – Timer and counting Devices. Device Drivers and Interrupts Servicing Mechanism: Device drivers – Parallel Port device drivers in a system – Serial Port device in a system – Device drivers for internal programmable timing devices – Interrupt servicing mechanism – context and the periods for context-switching, deadline and interrupt latency

UNIT III

Program modeling concepts in single & Multiprocessor systems software- Development Process: Modeling Processes for Software analysis before software   Implementation – Programming models for event controlled or response time constrained real time programs – Modeling for microprocessor systems. Software Engineering Practices in the Embedded Software Development Process: Software algorithm complexity – Software Development process life cycle and its models – Software analysis – Software design – Software implementation – Software Testing, Validating and Debugging – Real time programming issues during the software development process – Software project management – Software maintenance – UML.

UNIT IV

Inter – process communication & Synchronization of processes, Tasks and threads: Multiple processes in an application – Problem of sharing data by multiple tasks and routines – Inter Process communication.

REAL TIME OPERATING SYSTEM:-   Real time and Embedded systems operating systems – Interrupt routines in RTOS environment – RTOS Task scheduling models, Interrupt latency and Response times of the Tasks as performance Metrices – performance Metric in scheduling models for periodic, sporadic and Aperiodic Tasks – IEEE standard POSIX 1003.1b functions for Standardization of RTOS and Inter-task communication functions – List of Basic actions in a preemptive scheduler and Expected times taken at a processor – Filters – point strategy for synchronization between the processes, ISRs, OS functions and tasks and for Resource management – Embedded Linux Internals

UNIT V

Hardware – Software co-design in an embedded System: Embedded System Project Management – Embedded system design and co-design issues in system development processes – Design cycle in the development phase for an Embedded system – Uses of Target system, or its Emulator and In-circuit Emulator – Use of software tools for development of an embedded system – Use of scopes and logic analysis for system hardware tests – Issues in Embedded system design

Case Study: An Embedded System for an Adaptive cruise control system in a car, embedded system for a smart card.

REFERENCE BOOKS
1. Raj Kamal, "Embedded Systems – Architecture, programming and design", Tata Mcgraw – Hill, 2003.
2. David E. Simon, "An Embedded Software primer" Pearson Education Asia, 2003.

SPECIAL ELECTIVE I.2   MULTIMEDIA

Subject Description
      This Course presents the Multimedia baiscs
Goals
To enable the students to learn the fundamentals and Tools in Multimedia to develop applications

Objectives
On successful completion of the course the students should have:
- Understood How to design the Web page using Multimedia

Contents
Unit I

What is Multimedia – Introduction to making Multimedia – Macintosh and Windows Production platforms – Basic Software tools.

Unit II

Making Instant Multimedia – Multimedia authoring tools – Multimedia building blocks – Text – Sound.

Unit III

Images – Animation – Video

Unit IV

Multimedia and the Internet – The Internet and how it works – Tools for World Wide Web – Designing for the World Wide Wed.

Unit V

High Definition Television and Desktop Computing – Knowledge based Multimedia systems.

RERERENCE BOOKS

1. Tay Vaughan, "Multimedia making it work", Fifth Edition, Tata McGraw Hill

2. John F. Koegel Bufford, "Multimedia Systems", Pearson Education

3. Multimedia in Practice (Technology and Applications) – Judith Jeffloate – PHI

SPECIAL ELECTIVE I.3   NEURAL NETWORKS AND FUZZY SYSTEMS

Subject Description
        This Course presents the details of Neural Networks and Fuzzy Systems

Goals
 To enable the students to learn the fundamentals of Neural Networks and Fuzzy Systems

 Objective
 On successful completion of the course the students should have:
- Understood the trends and principles of Fopfield Networks and Fuzzy Sets

Contents

UNIT I
        Pattern classification – Learning Generalization – Structure of neural networks – ADA line, Delta rule – input output value – perceptions – Linear separability – Back propagation – XOR Function – Introduction to Boolean Neural Networks.

UNIT II
        Hopfield Networks – Energy – The Hamming Network – RAM – Boltzmann machine – Instar, Outstar Network – ART – Kohonen's Network Neocognitron.

UNIT III
        Fuzzy relation – Member function – Fuzzy matrices – Fuzzy Entropy – Fuzzy operation – Fuzzy composition.

UNIT IV
        Fuzzy variables – Linguistic Variables – Measure of fuzziness – Transition Matrix – Concept of Defuzzification and applications

UNIT V
        CASE STUDY : Application of Neural Networks in Character recognition, drug discovery, speech recognition, Application of Fuzzy logic Concepts in Fuzzy Controller design and Fuzzy querying in Relational Database Model.

REFERENCE BOOKS:
1. P.D.Wasserman,"Neural Computing and practice",Van Nostran ReinHold, NewYork, 1991.
2. Limin Fu,"Neural Network in Computer Intelligence", McGraw Hill International editions,1994
3. B Kosko."Neural Network and Fuzzy Systems",Prentice Hall,1996.
4. Klir & Yuan."Fuzzy Sets and Fuzzy Logic", Theory and Applications,Prentice Hall of India.

SPECIAL ELECTIVE I.4   SIMULATION & MODELLING

Subject Description : This course presents the Principles of Modeling, Random Generation and Simulation Techniques.

Goals : To enable the students to gain knowledge in Simulation techniques and languages, random number generation and distribution techniques.

Objectives
On Successful completion of the course the students should have:
- Gained Knowledge of Simulation & Modeling Techniques.

UNIT I

Principle of computer modeling and simulation, Monte Carlo simulation. Nature of computer modelling and simulation. Limitations of simulation, areas of application. System and environment – components of a system – Discrete and continuous systems. Models of a system – A variety of modelling approaches.

UNIT II

Random number generation, technique for generating random numbers – Midsquare method – The midproduct method – Constant multiplier technique – Additive congruential method – Linear congruencies method – Tests for random number – The Kolmogorov Smirnov test – The chi-square test.

Random variable generation – Inverse transform technique – Exponential distribution – Uniform distribution – Weibull distribution, empirical continuous distribution – Generating approximate normal variates.

UNIT III

Empirical discrete distribution – Discrete uniform distribution – Poisson distribution – Geometric distribution – Acceptance – Rejection technique for Poisson distribution – Gamma distribution.

UNIT IV

Design and evaluation of simulation experiments – Input – Output analysis – Variance reduction technique – Verification and validation of simulation models. Discrete event simulation – Concepts in discrete – event simulation – Manual simulation using event scheduling, single channel queue, two server queue, simulation of inventory problems.

UNIT V
    Simulation languages – GPSS – SIMSCRIPT – SIMULA – Programming for discrete event systems in GPSS and C.
Case Study: Simulation of LAN – Manufacturing system – Hospital management system.

REFERENCE BOOKS
1. Jerry Banks and John S. Carson II, "Discrete Event System Simulation", Prentice Hall Inc, 1984.
2. Narsingh Deo, "System Simulation with Digital Computer", Prentice Hall of India, 1979.
3. Francis Neelamkovil, "Computer Simulation and Modeling", John Wiley & Sons, 1987.
4. Averil M. Law and W. David Kelton, "Simulation Modeling and Analysis", McGraw Hill International Editions, 1991.

SPECIAL ELECTIVE II.1 CLIENT / SERVER TECHNOLOGY

Subject Description
This course presents the concepts of Network Monitoring & control
Goals
To enable the students to learn the concepts of network security and management
Objectives
On Successful completion of the course the students should have:
> ➤ Understood the Network Monitoring concepts and protocols

UNIT-I: Basic concepts of client /server: Characteristics. File servers – transaction servers – groupware servers – object servers – web severs – fat servers or fat clients – 2-tier – client/server building blocks. Operating system services: Base services –extended services – server scalability- client anatomy.

UNIT-II: NOS middleware peer-to-peer communication –Remote Procedure Calls –MOM middleware – SQL database servers: Server architecture – stored procedures – triggers – rules.

UNIT-III: Online transaction processing – Decision support systems – OLTP vs. DSS – Data warehouses: elements – hierarchies – replication vs. direct access – replication mechanism – EIS /DSS tools – client/server transaction processing: transaction models – TP monitors - transaction management standards.

UNIT-IV: Groupware: Components – components and distributed objects. CORBA: components - object management architecture – services – business objects.

UNIT-V: Client/server distributed system management-components - management application – the internet management protocols –OSI management protocols – OSI management framework - the desktop management interface - X/OPEN management standards – client/server application development tools - client /server application design.

REFERENCE BOOKS:

1. Robert Orafli, Dan Harkey and John Wiley, "THE ESSENTIAL CLIENT/SERVER SURVIVAL GUIDE", 2nd Edition Galgotia Publication, 2005.
2. Dawna Travis Dewire, "CLIENT /SERVER COMPUTING", Tata Mc Graw Hill 2003.

SPECIAL ELECTIVE II.2 DATA MINING AND WAREHOUSING

Subject Description:
This course presents the basic data mining, data mining techniques, classification, clustering and data warehousing.

Goal:
To enable the students learn the data mining techniques and data warehousing concepts.
Objectives:
On successful completion of the course the students should have:
- Understood the data mining and data warehousing techniques.

UNIT I

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrices – social implications of data mining – data mining from a database perspective.

Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.

UNIT II

Classification: Introduction – Statistical – based algorithms - distance – based algorithms – decision tree - based algorithms - neural network – based algorithms –rule - based algorithms – combining techniques.

UNIT III

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitional Algorithms.

Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.

UNIT IV

Data warehousing: an introduction - characteristics of a data warehouse – data marts – other aspects of data mart. Online analytical processing: introduction - OLTP & OLAP systems – data modelling –star schema for multidimensional view –data modelling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.

UNIT V

Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse.

Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.

REFERENCE BOOKS

1. Margaret H. Dunham, "Data mining introductory and advanced topics", Pearson education, 2003.
2. C.S.R. Prabhu, "Data warehousing concepts, techniques, products and applications", PHI, Second Edition.
3. Arun K.Pujari, " Techniques", Universities Press (India) Pvt. Ltd., 2003.
4. Alex Berson, Stephen J. Smith, "data warehousing, data mining, & OLAP, TMCH, 2001.
5. Jiawei Han & Micheline Kamber, " Data mining Concepts & Techniques", 2001, Academic press

SPECIAL ELECTIVE II.3   DISTRIBUTED COMPUTING

Subject Description

This Course presents the distributed computing techniques emphasizing the client server model

Goals

To enable the students to learn the concepts of distributed computing

Objectives

On successful completion of the course the students should have:

- Understood the trends and principles of distributed computing

Contents

UNIT I

Distributed Systems: Fully Distributed Processing systems – Networks and interconnection structures – designing a distributed processing g system.

UNIT II

Distributed systems: Pros and Cons of distributed processing – Distributed databases – the challenges of distributed data – loading, factors – managing the distributed resources division of responsibilities.

UNIT III

Design considerations: Communication Line loading – line loading calculations- partitioning and allocation - data flow systems – dimensional analysis- network database design considerations- ration analysis- database decision trees- synchronization of network databases

UNIT IV
       Client server network model: Concept – file server – printer server and e-mail server

UNIT V
       Distributed databases: An overview, distributed databases- principles of distributed databases – levels of transparency- distributed database design- the R* project techniques problem of heterogeneous distributed databases

Reference:
1. John a. Sharp, "An introduction to distributed and parallel processing g" *Blackwell Scientific Publication(Unit I & III)*
2. Uyless D. Black, "Data communication and distributed networks"(unit II)
3. Joel M.Crichllow "introduction to distributed & parallel computing (Unit IV)
4. Stefans Ceri, Ginseppe Pelagatti "Distributed database Principles and systems" *McGraw Hill*

SPECIAL ELECTIVE II.4   WAP

Subject Description
 This Course presents the elements of wireless application protocol

Goals
 To enable the students to learn the concepts of WAP

Objectives
 On successful completion of the course the students should have:
- Understood the trends and principles of WAP

Contents
UNIT I

       Mobile Internet: Introduction, Mobile Data – connectivity- Key services for mobile internet access and application service providers: Content providers and developers

UNIT II
       Mobile Internet Standards: Current web technologies for wires applications: origin , WAP components of wap standard: Network Infrastructure service supporting WAP –Principle tools, Software editors and emulators

UNIT III
       Implementing WAP services: WML Basics and Document model; content generation, enhanced WM: WML Script, rules of script, standard libraries, user interface design

UNIT IV

Tailoring contents to client: Techniques using HTTP1.1; WAP Push, Push access, Push Technology, MIME media types for push messages; Proxy gateway; data base driven applications for WAP ; Object Model- ActiveX database objects(ADO); End-to-end WAP services-Security issues

UNIT V

WTA Architecture; client framework; Server and security; Design of Application creation Toolbox; WA enhancements; Technology, Bluetooth and voice xml

Reference:

1. Sandeep Singal et al. "WAP writing applications for Mobile Internet" *Pearson Education* Data Bubrook "WAP:A beginners guide", *Tata McGraw Hill*